Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service	IB Docket No. 17-95

PETITION FOR RECONSIDERATION OF IRIDIUM SATELLITE LLC

INTRODUCTION

Pursuant to Section 1.429 of the Commission's rules, Iridium Satellite LLC ("Iridium") hereby petitions for partial reconsideration of the September 27, 2018 decision ("*Order*") facilitating the deployment of earth stations in motion ("ESIMs") communicating with satellites in geostationary orbit ("GSO") operating in the Fixed-Satellite Service ("FSS").[1] Iridium's request is limited to the part of the *Order* addressing GSO FSS ESIMs in the 29.25-29.3 GHz sub-band that is shared with Iridium's non-geostationary orbit ("NGSO") mobile-satellite service ("MSS") feeder links.

After the *Order* was adopted, the United States worked extensively with its regional partners to prepare for the World Radiocommunication Conference 2019 ("WRC-19"), leading to the development of a CITEL position that alone warrants reconsideration of the *Order*'s decisions governing 29.25-29.3 GHz. The CITEL position, which relies on additional technical studies

[1] The *Order* was published in the Federal Register on October 8, 2019. *See Earth Stations in Motion*, IB Docket No. 17-95, FCC 18-138, 84 Fed. Reg. 53,630 (Oct. 8, 2019).

conducted by ITU-R Working Party 4A ("WP4A"), recognizes that coordination between ESIMs and NGSO MSS feeder uplinks is feasible only to the extent that ESIMs comply with certain operating parameters, and that additional rules beyond a general coordination mandate are needed to ensure that ESIMs do not cause unacceptable interference. The *Order*, on the other hand, broadly concludes that "coordination is feasible" and adopts no further requirements to ensure the protection of Iridium's network.[2] In light of the additional examination of the issue, the Commission should defer permitting GSO FSS ESIMs in the 29.25-29.3 GHz sub-band until after it determines how and under what conditions ESIMs can be coordinated effectively with NGSO MSS feeder links.

DISCUSSION

In the *NPRM*, the Commission sought comment on whether permitting GSO ESIMs in the 29.25-29.3 GHz band "would raise any new issues with respect to potential interference to NGSO FSS feeder links," noting that "ESIM applicants and licensees planning to conduct operations in the 29.25-29.3 GHz band would have to coordinate with Iridium under 47 CFR §§ 25.203(h) and 25.258 prior to operating in those frequencies."[3] During the rulemaking, Iridium demonstrated that the constant and unpredictable motion of ESIMs raised very significant new interference concerns, and that Section 25.258's bare directive that Iridium and GSO FSS operators "coordinate their systems" would not provide Iridium with sufficient protection.[4]

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[2] *Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service*, Report and Order and Further Notice of Proposed Rulemaking, 33 FCC Rcd. 9327, 9345 ¶ 57 (IB 2018) ("*Order*").

[3] *Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service*, Notice of Proposed Rulemaking, 32 FCC Rcd. 4239, 4253-54 ¶ 54 & n.56 (IB 2017) ("*NPRM*").

[4] *See* Letter from Scott Blake Harris, Counsel to Iridium Communications, Inc., to Marlene H. Dortch, Secretary, FCC, at 2-3, IB Docket No. 17-95 (filed July 11, 2018) ("Iridium July 11, 2018 Ex Parte"); *see also* Letter from Scott Blake Harris, Counsel to Iridium Communications, Inc., to Marlene H. Dortch, Secretary, FCC, at 8, IB

Specifically, Iridium explained that the primary method for coordinating GSO FSS systems and NGSO MSS feeder links has been to define exclusion zones beyond which it can be confirmed that GSO earth stations will not cause unacceptable interference. With ESIMs, however, the variables that determine the coordinates of an exclusion zone "cannot . . . be determined *a priori*, because the number and locations of these ESIMs with respect to Iridium satellites moving in space are unknown."[5] Iridium also explained that the GSO ESIM network access scheme and the variable number of beams supporting ESIMs in a given geographical region around an Iridium gateway complicate the matter further. While the use of a specific access scheme might impose a natural limit on the number of ESIM terminals that can interfere with an Iridium feeder link simultaneously, they provide no information about whether the time aggregation of short-term interference events—*i.e.*, "the summation of the multiple, independent interference events generated by each ESIM over time, each of which contributes to periods during which the Iridium feeder link becomes unavailable"—would breach Iridium's short-term protection criterion.[6] In addition, Iridium emphasized that multiple ESIMs operating at high duty cycles (as some operators have proposed) would compound these already significant barriers to an effective coordination.[7]

Iridium also described the challenges of managing ESIM interference in real-time, without the use of predefined exclusion zones. Iridium explained that "no single ESIM terminal would be aware of how much interference the other ESIMs are contributing and have contributed towards the threshold of acceptable interference at the Iridium satellites," and thus no single ESIM terminal

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Docket No. 17-95 (filed Jan. 18, 2018) ("Iridium Jan. 18, 2018 Ex Parte"); Comments of Iridium Satellite LLC at 16-17, IB Docket No. 17-95 (filed July 31, 2017) ("Iridium Comments"); Reply Comments of Iridium Satellite LLC at 5-7, IB Docket No. 17-95 (filed Aug. 30, 2017) ("Iridium Reply Comments").

5 Iridium July 11, 2018 Ex Parte at 2.

6 *Id.*; *see also* Letter from Scott Blake Harris, Counsel to Iridium, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 17-95 (filed Mar. 22, 2018).

7 Iridium July 11, 2018 Ex Parte at 4; *see also* Iridium Jan. 18, 2018 Ex Parte at 6-7.

would know when not to transmit. Iridium also explained that while a network control and monitoring center "could track how many ESIMs are transmitting and where they are," it would be unable "to develop knowledge of *how much interference* each ESIM contributes at the Iridium satellite, and thus the amount and duration of aggregate interference received by Iridium's continuously moving satellite receivers."[8] Furthermore, in the event that ESIMs do cause excessive interference into Iridium's feeder links, Iridium would be "unable to identify the ESIMs responsible for breaching its network's protection criteria—or even confirm that the cause is an ESIM at all."[9]

In light of these concerns, Iridium asked the Commission not to permit ESIMs in the 29.25-29.3 GHz sub-band until the industry further explored the feasibility of and necessary operating conditions for effective coordination.[10] Iridium noted "that as recently as July 2018, the ITU working group examining ESIM compatibility with NGSO MSS feeder links concluded that further analysis of the issue is required."[11] In the alternative, Iridium asked the Commission to permit ESIMs in the sub-band subject to a coordination requirement, but only if the GSO FSS operator pursues a coordination mechanism that the Commission concluded could yield compatible operations.[12]

In the *Order*, the Commission nevertheless authorized ESIMs in the 29.25-29.3 GHz sub-band, concluding that "coordination under Section 25.258(a) will provide Iridium with sufficient

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8 Iridium July 11, 2018 Ex Parte at 2.

9 *Id.*

10 *See, e.g.*, Letter from Scott Blake Harris to Marlene H. Dortch, Secretary, FCC, IB Docket No. 17-95 (filed Sept. 12, 2018) ("Iridium September 12 Ex Parte"); *see also* Iridium July 11, 2018 Ex Parte; Iridium Comments; Iridium Reply Comments; Iridium Jan. 18, 2018 Ex Parte at 8-9.

11 Iridium September 12 Ex Parte at 1 (citing *Earth stations in motion (ESIM) compatibility with non-GSO MSS feeder links in the bands 19.3-19.7 GHz and 29.1-29.5 GHz*, Annex 15 to Working Party 4A Chairman's Report, Doc No. 4A/TEMP/345, at 10 & Editor's Note to Annex A, 15 (rel. July 23, 2018)).

12 *Id.* at 2-3.

interference protection."[13] The Commission's technical basis was the possibility that ESIMs might altogether avoid generating in-line interference events by not transmitting in the 29.25-29.3 GHz band when passing through the region in space where an Iridium satellite is or could be in view of an Iridium gateway.[14] Even though this was "the only mechanism[] identified in the item for operating ESIMs compatibly with Iridium's feeder links," the Commission rejected Iridium's alternative request to require that GSO ESIM operators use it.[15] As a result, the *Order* exposed Section 25.258 coordinations—and Iridium's right to operate its network free from impermissible interference—to a destabilizing and inefficient uncertainty: while real-world operating conditions or a GSO FSS operator's preferred coordination strategy may make it impossible to verify that Iridium's network will be protected, Section 25.258 would nevertheless leave the door open for the GSO FSS operator to demand coordination.

The Commission should reconsider this open-ended approach and defer its decision on authorizing ESIMs in the 29.25-29.3 GHz band until more work is done to identify the circumstances under which coordination is feasible and how it might occur.

First, additional analysis conducted by ITU-R working groups and regional bodies during WRC-19 preparation demonstrate that the *Order*'s open-ended coordination mandate was premature. As the Commission is aware, Agenda Item 1.5 at the WRC-19 will consider the use of additional Ka-band frequencies for "earth stations in motion communicating with geostationary space stations in the fixed-satellite service" and take appropriate action.[16] To prepare for WRC-19, WP4A conducted technical studies examining the compatibility between ESIMs and NGSO MSS

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[13] *Order* at ¶ 56.

[14] *Id.*

[15] Iridium September 12 Ex Parte at 2; *see Order* at ¶¶ 56-57.

[16] *See* Resolution 158 (WRC-15).

feeder links.[17] Examinations conducted after the *Order* was adopted revealed that coordination is only likely to be feasible under very specific operating conditions, and that, outside those defined parameters, additional regulatory protections are needed to ensure that ESIMs do not cause unacceptable interference.[18]

CITEL's position on Agenda Item 1.5 likewise recognizes that ESIMs and Iridium feeder links can coordinate only to the extent that ESIMs comply with specific operating parameters.[19] Based on the WP4A studies, CITEL concluded that "coordination" can be "used to ensure compatibility" *only if* the GSO FSS network's ESIMs (1) transmit with a specified EIRP density per carrier (≤35.5 dBW/MHz), (2) have an off-axis EIRP density that complies R.R. No. 22.32, and—notably—(3) are relatively small in number (≤ 6 transmitting in a single satellite beam in a 15 MHz channel), and (4) operate with a relatively low average duty cycle (a carrier burst duty cycle ≤ 10% averaged over 30 seconds).[20] While these requirements do not guarantee of compatible operations, they reduce the risk of unacceptable interference into the Iridium network, and may better equip GSO FSS operators and Iridium to manage the unpredictable nature of ESIM interference described on the record of this proceeding.

The analysis coming out of WP4A and CITEL plainly warrants reconsideration of the matter by the Commission. Under Rule 1.429, "reconsideration is generally appropriate where the petitioner shows either a material error or omission in the original order or raises additional facts not

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17 *See Earth Stations in Motion (ESIM) Compatibility with Non-GSO MSS Feeder Links in the Bands 19.3-19.7 GHz and 29.1-29.5 GHz*, Preliminary draft new Report, Annex 04 to Report on the meeting of Working Party 4A (July 11, 2019).

18 *Id.*

19 Member States of Inter-American Telecommunication Commission (CITEL), Proposals for the Work of the Conference, Addendum 5 to Document 11-E, at Annex 1bis (Sept. 16, 2019) ("CITEL WRC-19 Proposal for Agenda Item 1.5"), https://www.itu.int/dms_pub/itu-r/md/16/wrc19/c/R16-WRC19-C-0011!A5!MSW-E.docx.

20 *Id.*

known or not existing until after the petitioner's last opportunity to respond."[21] Here, analysis post-dating the *Order* shows that the Commission's blanket conclusion that "coordination is feasible" and that "Section 25.258(a) will provide Iridium with sufficient interference protection" was at best incomplete, and must be qualified to ensure a safe and efficient operating environment for all licensees.[22] The *Order* does not contain the "specific operational and regulatory conditions" that must accompany any rule permitting ESIMs to operate in the 29.25-29.3 GHz sub-band on a coordinated basis,[23] and it elides the important qualifications noted in the CITEL position and WP4A studies about when coordination actually has a chance of succeeding. Thus, on reconsideration, the Commission should decline to permit ESIMs to communicate with GSO FSS networks in the 29.25-29.3 GHz sub-band until it determines the operational conditions that ESIMs must observe to make coordination a realistic and adequately protective possibility.

Second, even at the time the *Order* was adopted, the record developed by GSO FSS operators did not support the conclusion that coordination is generally feasible and that no additional requirements are needed to protect NGSO MSS feeder links. The only sharing studies submitted by ESIM operators assumed technical parameters with respect to power, number of terminals, and duty cycle that deviated sharply from the operations that they elsewhere had proposed.[24] Those studies also assumed that each ESIM would travel along paths known at the

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[21] *Amendment of Section 73.3555(e) of the Commission's Rules, National Television Multiple Ownership Rule*, Order on Reconsideration, 32 FCC Rcd. 3390, 3397 ¶ 16 (2017); *see also* 47 C.F.R. 1.429(b).

[22] *Order* at ¶ 56.

[23] CITEL WRC-19 Proposal for Agenda Item 1.5 at 3.

[24] *See* Iridium Jan. 18, 2018 Ex Parte at 4-6; Letter from Scott Blake Harris, Counsel to Iridium Communications, Inc., to Marlene H. Dortch, Secretary, FCC, at 2, IB Docket No. 17-95 (filed June 18, 2018) ("Iridium June 18, 2018 Ex Parte").

time of coordination, which is unlikely to be true for many applications.[25] As a result, these studies only further confirm that successful coordination will require GSO FSS operators to comply with significant limits on planned ESIM operations.[26] Thus, instead of supporting the view that coordination is *generally* feasible and that no other regulatory requirements are necessary to prevent unacceptable interference into Iridium's network, the highly application-specific evidence submitted by GSO operators demonstrate that any obligation to coordinate should be limited to circumstances where coordination *actually is* feasible—which is precisely the approach that CITEL and WP4A have taken.

The Commission's own analysis of the record confirms that coordination may only be possible in a narrow set of cases. As mentioned, the only coordination mechanisms that the *Order* determined were plausible were the strategies described in paragraph 56. These strategies assumed that the relative positions of ESIMs, NGSO space stations, feeder-link earth stations, and FSS space stations could be taken into account in real-time, and that ESIMs could avoid producing any in-line interference events by ceasing transmission in the 29.25-29.3 GHz band when an Iridium satellite is or could be in view of an Iridium gateway.[27] But the fact that these strategies are theoretically possible does not mean they can or will be implemented in practice, and it does not mean that operators can ensure compatible operations using other strategies.[28] These limitations on the *Order*'s findings are especially significant because GSO FSS operators showed no interest in pursuing the strategies examined in paragraph 56, and likely will ask for far more during

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[25] *See* Iridium Jan. 18, 2018 Ex Parte at 4-6; Iridium June 18, 2018 Ex Parte at 2 (noting that "[f]light paths and times, truck routes and times, and maritime routes and times are subject to change, as is the number and mix of routes served by an ESIM operator").

[26] *See Order* at ¶ 53.

[27] *Id.* at ¶ 56.

[28] *Cf. id.* (declining to "specifically endorse either method" described in paragraph 56, and leaving "ESIMs operators and Iridium. . . free to explore other coordination mechanisms").

negotiations. Accordingly, on reconsideration, the Commission should defer permitting ESIMs in the 29.25-29.3 GHz sub-band until after it determines the operating conditions necessary for effective coordination.

CONCLUSION

The Commission generally does not permit new services to operate on a co-primary basis subject to a coordination requirement before confirming that coordination can actually protect existing services. Yet that is precisely what it did in the *Order*, as the record in this proceeding and the new analysis conducted for WRC-19 makes clear. Accordingly, Iridium urges the Commission to grant this petition and decline to permit ESIM operations in the 29.25-29.3 GHz band until after it determines what additional requirements are needed to ensure that coordination with NGSO MSS feeder links is feasible and will adequately protect NGSO MSS operators.

Respectfully submitted,

Maureen C. McLaughlin
Vice President, Public Policy
IRIDIUM SATELLITE LLC
1750 Tysons Boulevard, Suite 1400
McLean, VA 22102
(703) 287-7518

Scott Blake Harris
V. Shiva Goel
HARRIS, WILTSHIRE & GRANNIS LLP
1919 M Street, NW, 8th Floor
Washington, DC 20036
(202) 730-1313

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